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# Proceedings from the National Science Advisory Process on Guidance on the Formulation of Conservation Objectives, and identification of Indicators, Monitoring Protocols and Strategies for Bioregional Marine Protected Area Networks

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**Foreword**

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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## SUMMARY

Canada has made various domestic and international commitments to establish a network of marine protected areas (MPAs) (e.g., World Summit on Sustainable Development, the Convention on Biological Diversity, Canadian Biodiversity Strategy). As the lead department on national MPA network planning, Fisheries and Oceans Canada (DFO) is working with federal, provincial and territorial partners to design and establish the Canadian network of MPAs in accordance to Decision IX/20 of the Convention on Biological Diversity (UNEP 2008). Development of Canada's MPA network, to be composed of 13 bioregional MPA networks, is being guided by the 2011 *National Framework for Canada's Network of Marine Protected Areas* (Government of Canada 2011).

In 2009, Science provided general guidance regarding the design of MPA networks (DFO 2010). As the planning of MPA networks progresses, the priority is to define MPA network Conservation Objectives. Conservation Objectives are important components of a bioregional MPA network and to track progress on their achievement, network-level indicators and monitoring protocols and strategies are required. The science advice produced from this national meeting, held October 3 to 5, 2012 in Montreal, is the next step in providing guidance for the planning of bioregional MPA networks. Specifically, guidance is provided for the development of measurable conservation objectives, and identification of indicators, monitoring protocols and strategies to evaluate the effectiveness of the networks, and to ensure it is done in a consistent manner while allowing for flexibility to adapt to regional conditions. Participants included DFO Ecosystem and Oceans Science, Program Policy and Oceans, Parks Canada, Environment Canada, provincial/territorial experts and academia. The resulting publications from this meeting include a science advisory report, a research document and these proceedings.

## SOMMAIRE

Le Canada a pris divers engagements nationaux et internationaux visant à établir un réseau d'aires marines protégées (AMP) (p. ex., Sommet mondial pour le développement durable, Convention sur la diversité biologique et Stratégie canadienne de la biodiversité). En tant que ministère responsable de la planification du réseau national d'AMP, Pêches et Océans Canada (MPO) travaille en collaboration avec des partenaires fédéraux, provinciaux et territoriaux en vue de concevoir et d'établir un réseau canadien d'AMP conformément à la décision IX/20 de la Convention sur la diversité biologique (CBD) [Programme des Nations Unies pour l'environnement ou PNUE 2008]. Le Cadre national pour le réseau canadien d'aires marines protégées de 2011 (gouvernement du Canada 2011) oriente la mise en œuvre d'un réseau canadien, qui sera composé de 13 réseaux biorégionaux d'AMP.

En 2009, le Secteur des sciences a fourni des lignes directrices générales au sujet de la conception des réseaux d'AMP (MPO 2010). À mesure que la planification des réseaux d'AMP se poursuit, la priorité est de définir les objectifs de conservation pour le réseau d'AMP. Les objectifs de conservation constituent des composantes importantes d'un réseau biorégional d'AMP et il faut donc disposer d'indicateurs, ainsi que de protocoles et de stratégies de suivi, à l'échelle du réseau pour évaluer les progrès réalisés par rapport à ces objectifs. L'avis scientifique qui découlera de la réunion nationale tenue du 3 au 5 octobre 2012 à Montréal est la prochaine étape définissant les orientations pour la planification des réseaux biorégionaux d'AMP. Plus particulièrement, une orientation est fournie à l'égard de l'élaboration d'objectifs de conservation mesurables et de la définition d'indicateurs, de protocoles et de stratégies de suivi en vue d'évaluer l'efficacité des réseaux et afin de veiller à ce que leur création soit cohérente et suffisamment souple pour permettre l'adaptation aux conditions régionales. Les intervenants qui ont participé à la réunion sont les secteurs des Sciences des écosystèmes et des océans, des Politiques relatives aux programmes et des Océans du MPO, Parcs Canada, Environnement Canada, des experts provinciaux et territoriaux et des représentants du milieu universitaire. Les publications qui ont découlé de cette réunion consistent en un avis scientifique, un document de recherche et le présent compte rendu.

## INTRODUCTION

The purpose of this national science peer review process was to provide national guidance for the development of measureable conservation objectives for Canada's bioregional MPA networks, as well as guidance on the identification of indicators, monitoring protocols and strategies to evaluate the effectiveness of the networks. Meeting participants included DFO Ecosystem and Oceans Science, Program Policy and Oceans, Parks Canada, Environment Canada, provincial/territorial experts and academia (Appendix 1). The two objectives of this national peer review process, as outlined in the Terms of Reference (Appendix 2), were to provide:

1. Guidance on the formulation of conservation objectives for bioregional MPA Networks in Canada.

   Develop guidance on the formulation of measurable conservation objectives for Canada's bioregional networks of MPAs (types and phrasing of objectives, consistent with national MPA network goals). Include the level of specificity that conservation objectives should have in order to identify indicators for monitoring. Provide guidance on whether network-level conservation objectives should differ from, relate to, or complement site-specific MPA conservation objectives and how. In developing the guidance, the following information was considered:

   a. International best practices related to the formulation of conservation objectives for MPA networks;

   b. Existing guidelines for phrasing conservation objectives that were developed for the LOMAs; and,

   c. Existing domestic science advice specific to regional MPA networks.

2. Guidance on the selection of indicators and development of monitoring protocols and strategies to evaluate the effectiveness of Canada's bioregional MPA networks in meeting their conservation objectives.

   Develop guidance for identifying indicators and developing monitoring protocols and strategies that would effectively measure changes of the indicator over time, to evaluate if the conservation objectives of the MPA network are being achieved. Provide guidance on setting benchmarks for indicator evaluation for general conservation objectives such as those included in goal #1 of the National Framework (marine biodiversity, ecosystem function and special natural features). To the extent possible, include recommendations on the types of analyses that could be used to measure the effectiveness of the network in meeting its conservation objectives. In developing the guidance, the following information was considered:

   a. International best practices related to indicators and monitoring protocols to evaluate effectiveness of an MPA network in achieving its objectives;

   b. Existing science advice (domestic and international) on selection of appropriate and meaningful monitoring indicators.

Both the international and national commitments to establish MPA networks were reviewed as background for the process as well as the Convention on Biological Diversity (CBD) technical guidance on establishing MPA networks (DFO 2007, 2008, 2010; UNEP 2006, 2008). In addition, past science advice, which has been developed in support of MPA network implementation (DFO 2009, 2010) as well as existing guidelines for phrasing conservation objectives, which had been developed for Large Ocean Management Areas (LOMAs) (DFO 2007, 2008), were reviewed to support the development of guidance on the formulation of conservation objectives.

Following introductory remarks by the co-chairs, review of CSAS process guidelines and the meeting agenda, there was a discussion concerning monitoring of MPA networks and the effectiveness of MPAs within the broader context of oceans management. It was noted that the advice from this process would support the development of MPA networks.

## PRESENTATIONS

### NATIONAL FRAMEWORK FOR CANADA'S NETWORK OF MARINE PROTECTED AREAS

**Presenter - Mary Rothfels (Manager, DFO-Oceans Policy)**

#### Summary

The 2011 *National Framework for Canada's Network of Marine Protected Areas* (Government of Canada 2011) was presented and an update was provided on the status of MPA network planning at the bioregional level. The primary goal of Canada's national MPA network centres on three elements – marine biodiversity, ecosystem function and special natural features – which provide direction for objective-setting at the strategic and operational levels. Although bioregional MPA network planning is at an early stage and is restricted to five of 13 bioregions, setting network conservation objectives is tied to MPA network design and guidance from this CSAS will be immediately useful for MPA network planners. In the longer term, once gaps in the bioregional MPA network designs start to be filled with new federal-provincial-territorial spatial conservation measures, and the bioregional MPA networks become functional as cohesive entities rather than a collection of individual MPAs, it will be useful to have more detailed guidance at hand on how to set indicators and monitor the effectiveness of specific networks.

#### Discussion

There was a question regarding the relationship between DFO, who provides a coordination role, and the broader national and more specific bioregional efforts on MPAs, which include Environment Canada, Parks Canada and provincial and territorial government agencies.

### INTERNATIONAL PRACTICES RELATED TO THE FORMULATION OF CONSERVATION OBJECTIVES FOR MPA NETWORKS

**Presenter – Glen Jamieson**

#### Summary

An overview of how conservation objectives for MPA networks were determined internationally was presented, based on the report by Jamieson (2012). MPA networks that were most functionally effective and well documented were in Australia and California. In part this was because only "single jurisdictions" and "ecosystems" were involved in each of these areas, which gave managers full authority to establish a comprehensive, functional network in a timely manner; and also because networks there have been established for at least a decade, allowing increased time for both refinement (adaptive management) and network evaluation. Conservation objective characteristics of these networks were thus focused on and summarized. Network conservation objectives are mostly conceptual, higher-level ones, whereas those for individual MPAs tend to address specific local issues. Network objectives were strategic and focused on elements that were common to most of the individual MPA sites. Network objectives were often a re-statement of the goals in the legislation under which the MPAs were being put into effect. The extent to which site-specific objectives actually relate to the overall network's objectives is typically not clearly specified, and will likely only be

assessable though future monitoring of the status of species or with better mapping of habitat features and types.

### Expert Reviewer Presentations

Expert reviewers Isabelle Côté and John Roff presented their reviews of the working paper (Appendix 3 and 4).

#### Review by Isabelle Côté

Isabelle Côté noted that the working paper covered a range of case studies of MPA 'networks', which vary greatly in characteristics and provided a comparison (Appendix 3, Table 1). She indicated that it is not clear to what extent these sets of MPAs actually function as networks at present. The overarching goals of the networks reviewed were also highly variable and she presented a cursory analysis of keywords derived from the network goals (Appendix 3, Table 2). She noted that the wording of network objectives is clearest when legislation is very explicit and provided examples.

In general, Isabelle Côté found the review to be thorough, and noted that the author did a remarkable job given the number and specificity of questions set out in the Terms of Reference for the working paper. The case studies selected are those which would be expected to be included in such a review. The only missing case study indicated by Dr. Côté is New Zealand which, with an MPA system under a single political jurisdiction, would have been a potentially relevant addition. She noted the synthesis and conclusions are well articulated and accurately reflect the material presented. The summary tables (Tables 9 and 10) are very useful as a distillation of a large amount of information. Several points were presented to make the review more effective (Appendix 3).

#### Review by John Roff

John Roff provided a review and summary of the paper and indicated that it was acceptable as a research document, noting that some revision is needed for consistency in terminology such as use of the term "network" along with general corrections to grammar, spelling, etc. He provided a summary of what the paper does followed by what the paper does not do (Appendix 4). These points contributed to the meeting's discussions.

### Discussion

The importance and principles of connectivity were discussed. How connectivity relates to conservation objectives as well as how this may influence benchmarks and indicators was noted. It was argued that all features of networks are inherited from networks for terrestrial areas for which connectivity is fundamental and the same concepts do not apply to the marine environment. For MPAs, it was recommended that connectivity (in the direct terrestrial sense of transfer of individuals) not be considered a necessary property for *all* MPAs in a network, but be used as a planning feature *only* in cases where there could be a risk of physical barriers to the flow of individuals (perhaps of different life history stages).

It was suggested that the approach that California took provides some general guidance regarding the size of sites and how far apart they should be. It was noted that this is a practical approach that can be adapted over time. Concern was expressed that once a site is established, it is difficult to re-locate.

## PAST ADVICE ON CONSERVATION OBJECTIVES AND PRIORITIZATION

**Presenter – Jake Rice**

## Summary

Ecological input to comprehensive integrated management of LOMAs has been structured around four conservation priorities: Ecologically and Biologically Significant Areas (EBSA), Ecologically Significant Species (ESS), depleted species and degraded areas. There are essentially two different kinds of Conservation Objectives; protection and/or to improve the state. The goals of MPA networks are to protect biodiversity, ecosystem function and special places. Past advice on Conservation Objectives (DFO 2007) identified that the top tier of conservation priorities would have ecological rationales similar to ESS, depleted species or degraded areas, would be significant to several ecological layers and would meet several EBSA criteria. This advice recommended that if there are well designed spatial measures then some part of ecological function and structure can be protected. For a conservation objective to be meaningful, specificity of phrasing is needed. As much as possible, conservation objectives should use language that corresponds to language in policies, regulations and legislation. Further science advice developed in 2008 (DFO 2008) established the Ecosystem Overview and Assessment Report framework. This advice reaffirmed that EBSA and ESS criteria and guidelines are a useful starting point as well as past guidelines of prioritizing Conservation Objectives. Conservation Objectives for anthropogenic pressures are useful in management decision making. As well, Conservation Objectives for the state of specific structural and functional properties of ecosystems are meaningful and important to many stakeholders. Conservation Objectives used for policy and management require scientifically sound foundations. It is evident that past advice for EBSA and ESS is about protection from harm whereas the only advice on achieving an improved state is for depleted and degraded areas. However, all of this past advice is site/species specific and there has been no advice developed on networks. Specificity issues for conceptual objectives (captured in the goal of the network), strategic objectives (what things have to change or be retained) and operational objectives (measureable state reached when objective achieved) were noted as they apply to MPA networks.

## Discussion

It was suggested that if the anthropogenic pressures on a protected area/network can be regulated then the outcome should be self-sustaining. The Marine Strategy Framework Directive indicates that good environmental status must be achieved such as seafloor integrity. However, the seafloor is difficult to monitor and, therefore, it is difficult to evaluate whether it is getting better or worse. If the pressures are being managed, then it could be expected that environmental status is improving. At some point, there is a need to establish (monitor) what is happening outside rather than only inside the MPAs.

There was a discussion regarding whether it was necessary to develop new advice or if past advice on Conservation Objectives could apply to the networks. One of the proposed outcomes of the meeting's discussion was to specify the differences so that what is covered could be determined and the gaps identified.

# DEVELOPING CONSERVATION OBJECTIVES FOR A NETWORK OF MARINE PROTECTED AREAS IN THE SCOTIAN SHELF BIOREGION

**Authors - Maxine Westhead and Marty King (presenter)**

## Summary

Building on the considerable science, mapping and stakeholder engagement efforts over the last decade, the Oceans and Coastal Management Division of DFO-Maritimes has initiated a process to plan and implement an MPA network in the Scotian Shelf Bioregion. Two of the early

steps in the planning process are to set objectives for the network and compile relevant ecological, socioeconomic and cultural data. A Regional Science Advisory Process (RAP) was held in March 2012 to provide advice on draft conservation objectives and the ecological data that should be considered in designing the network. The objectives and data have been organized under the categories of ecosystem representation and EBSAs in an effort to make explicit links to the network planning guidance provided by the Conventional on Biological Diversity (CBD) (COP 9 Decision IX/20; UNEP 2008). The CBD guidance and relevant national advice was considered in developing the draft objectives. It was concluded at the RAP that the following statements could serve as draft Strategic Objectives for a bioregional network of MPAs: (1) Protect representative examples of all marine ecosystem and habitat types in the Scotian Shelf Bioregion [based on proposed coastline, coastal sub-tidal, and offshore classifications along with their associated biodiversity and ecological processes]; and (2) Protect EBSAs and other special natural features in the Scotian Shelf Bioregion [that may benefit from long-term, year-round spatial management]. However, it was also noted that additional objectives could be developed to reflect the 'added value' of a network of MPAs. Further guidance was provided on: (a) the ecosystem classification systems to use to assess representation, and (b) how to finalize the EBSAs in different planning areas. The draft Strategic Conservation Objectives will be refined based on emerging National Science guidance from this Science Advisory Process and through consultations with stakeholders. Additional priority activities include the development of design principles, and specific operational objectives that will serve as the basis for a monitoring plan for the network.

### Discussion

It was questioned what the added value is of the Scotian Shelf approach towards the network concept rather than a collection of MPAs. It was indicated that Strategic Objectives are needed for protecting different life stages for key species. It was suggested that, overall, the big difference between a set of MPAs and a network is in the planning. More specific guidance is needed in this area such as how far apart the areas should be located as well as identification of the features of the network versus the objectives (what you are trying to protect).

## DISCUSSION ON EXISTING APPROACHES AND METHODOLOGIES ON FORMULATING CONSERVATION OBJECTIVES FOR MPA NETWORKS

- It was agreed that definitions for Conservation Objectives should be included in the Science Advisory Report (SAR).
- At the network and component MPA levels, the Conservation Objectives should focus on how to achieve the desired state. It would help managers to set objectives for anthropogenic pressures that indicate you can achieve this state by keeping the pressures below a certain level as a vehicle to achieve a state objective (or a surrogate for other monitoring).
- The differences between LOMAs (permission) versus MPA network (prohibition) were examined. LOMAs and MPAs are similar in that there is a broader overarching objective, a more strategic level objective and then a specific objective. In a LOMA, EBSAs and ESS have been identified whereas a network is formed to increase protection. Network properties of representativity, replication, etc., allow the network to do more for conservation-oriented outcomes (such as biodiversity conservation) than a LOMA. In summary, it was agreed that the goal for the MPA network adopted nationally is to protect biodiversity, ecosystem function and special places whereas LOMAs have other aspects to be achieved such as sustainable use, equitable benefits, etc. A network should be seen as a tool to help accomplish strategic level objectives that guide design of the network.

There was consensus that MPA networks are a tool for achievement of some LOMA objectives.

- A subgroup was tasked to look at the subset of strategic objectives for the LOMAs, taking into account unpacking the subset of all those strategic objectives that deal with conservation of biodiversity, special features and ecological functions. The subgroup was asked to consider whether these are a suitable set of strategic objectives to deliver the overarching goal of the MPA network or are there additional areas that would need to be addressed.
- The plan for a way forward was presented: i) strategic objectives are a decomposition of what needs to be achieved (in some good state) to achieve the overarching MPA network goal; and ii) there was agreement that properties of the network specified in CBD to deliver the desired outcomes (i.e., EBSAs, representativity, adequacy, viability, connectivity and replication) are not objectives themselves. It was agreed that this would be included in the advice.
- It was questioned whether developing MPAs in the context of climate change should be included in the science guidance provided. It was agreed that the SAR could note the importance of long-term directional changes due to climate change, but that there was no information presented at the current advisory process to adequately inform this discussion.
- Timeframes for monitoring ecosystem function were discussed. Typically the timeframes are a composite of the natural timelines of the features, although many jurisdictions use five years. It was noted that badly perturbed systems may be maintained by processes perturbing the systems and take a long time to restore. It was suggested that the literature be reviewed to determine an appropriate timeframe.

## INTERNATIONAL PRACTICES RELATED TO THE IDENTIFICATION OF INDICATORS FOR MPA NETWORKS

**Presenter - Glen Jamieson**

### Summary

An overview of how indicators were determined and used internationally for assessments of MPA network performance was presented for the networks evaluated in detail in the report by Jamieson (2012). Specific indicators were not always initially determined, and often seemed to be determined only when an assessment of MPA (or MPA network) performance was planned and undertaken. Analyses that could be used to measure the effectiveness of an MPA network in meeting its conservation objectives have been attempted in the Great Barrier Reef Marine Protected Area (GBRMPA) and Victoria's MPA network in Australia, England's Natura 2000 MPA network, Convention for the Protection of the Marine Environment of the North-East-Atlantic Network, the Channel Islands Marine Sanctuary MPA networks, California's Marine Life Protection Act (MLPA) South and Central Coast Regions, the South African MPA network and the Phoenix Island Protected Area in Kiribati. The most comprehensive analysis was conducted in the GBRMPA, and while not yet implemented, has been developed for California's MLPA. Initial audits/performance evaluations in Victoria and South Africa revealed that the MPA networks there were not functional, and, therefore, summaries presented focused on descriptions of experiences in the other networks considered. Over-arching lessons that can be learnt from their efforts were suggested.

### Expert Reviewer Presentations

Expert reviews of the paper were presented by Isabelle Côté and John Roff (Appendices 3 and 4, respectively). Overall Isabelle Côté noted that the paper was a good overview of how indicators have been selected and networks evaluated at the international level. She noted that there was little distinction between monitoring MPAs and monitoring how well networks are performing.

John Roff indicated that inshore coastal and offshore networks should have different monitoring protocols noting that community engagement is more critical to inshore and that concepts of network effectiveness versus management need to be addressed. Furthermore, he indicated that if networks are not adequately established then there is not much point in doing an assessment. Specifically, if a network is established and a monitoring assessment done, the results (e.g., decline, no change, or improvement) need to be acted upon.

### Discussion

There was consensus to upgrade Jamieson's working paper to a CSAS Research Document with the following modifications: the summary tables from Isabelle Côté's presentation would be added to the paper, and a sentence would be added to clarify the use of the terminology of goal versus objective.

## OVERVIEW OF THE FUNCTIONS THAT MONITORING INDICATORS CAN SERVE IN AN MPA AND MPA NETWORK CONTEXT, AND THE PROPERTIES THAT ARE IMPORTANT FOR INDICATORS TO SERVE THOSE FUNCTIONS

**Presenter – Alida Bundy**

### Summary

Indicators are a variable, pointer or index for which fluctuations reveal key elements of a system. The position and trend of the indicator in relation to reference points or values indicates the present state and dynamics of the system. Indicators provide a bridge between objectives and actions. An indicator can also be a measure of something that cannot be measured directly. There are many different kinds of simple and complex indicators including biotic, abiotic, economic parameters, etc. Indicators serve four basic functions: simplification, quantification, standardization and communication. Some specific functions within the context of MPA and MPA networks include: 1) measuring progress towards explicit management or conservation objectives; 2) evaluating the effectiveness of specific policies; 3) assessing effectiveness of the network (whether it is functioning as a network); and 4) measuring the overall state of ecosystem health in the MPA network, individual MPAs or of selected ecosystem sub-components. Since ecosystems are complex and cannot be described using a single indicator, a parsimonious suite of indicators is needed that is tailored to the functional objective(s), avoids redundancy, ensures that all ecosystem attributes/properties are captured, and avoids bias. Various processes for selecting indicators based on established criteria as well as processes to evaluate metrics and indicators were described. Some criteria such as sensitivity, responsiveness and specificity are difficult to quantify. The process for selecting indicators for the Gully was presented as an example.

### Discussion

It was noted that the examples provided give an idea of the magnitude of work involved for each MPA.

Participants agreed that the process presented by Alida Bundy should be incorporated into the Science Advisory Report.

## FORMULATING MONITORING OBJECTIVES, INDICATORS AND PROTOCOLS IN THE TARIUM NIRYUTAT MPA AND FUTURE MPAs

**Presenter - Joclyn Paulic**

### Summary

The Tarium Niryutait Marine Protected Area (TNMPA) was designated as an *Oceans Act* (1997) MPA in 2010 and benefited from many years of experience and guidance on the formulation of conservation objectives and monitoring indicators and protocols. The TNMPA process and the work to develop the ecological and biological portion of a broader monitoring plan for the TNMPA have been ongoing since the area was first proposed. The lessons learned in the un-packing of broad overarching conservation objectives to operational objectives and the identification of indicators and protocols for the TNMPA were presented. In addition, some guiding principles on the prioritization of indicators and the selection of monitoring protocols were also presented. Drawing on these lessons learned, guidance was provided on how these principals can be used within the context of MPA Networks.

### Discussion

There was a discussion of how the indicators selected related to 5 of the original 30 conservation objectives.

## DISCUSSION OF EXISTING APPROACHES AND METHODOLOGIES ON IDENTIFYING INDICATORS, MONITORING PROTOCOLS AND STRATEGIES TO EVALUATE EFFECTIVENESS OF AN MPA NETWORK IN ACHIEVING ITS OBJECTIVE

It was noted that the difference between indicators for an MPA and for a network were not clear. There is a need to monitor against network objectives to show that the network is doing something more than the individual sites combined.

There was a discussion on whether agreement had been reached with respect to an earlier statement that MPAs are only for conservation and not for rebuilding ecosystems. It was noted that if individual MPAs are protected then we can protect the status quo whereas the expectation is that a network would go above and beyond the status quo. It was later argued that the network should aim for rebuilding as well as conservation.

## NEXT STEPS AND RECOMMENDED APPROACH FORWARD

It was agreed that definitions for conservation objectives and indicators would be included in the Science Advisory Report.

High level issues noted included:

- There are various types of indicators that work at both MPA and network levels;
- There are differences for inshore and offshore MPA networks and, as such, the indicators would be different;
- Benchmarks and timeframes can be determined in the context of the indicators; and
- There is a need to further explore if indicators of individual MPAs can be used to evaluate the efficiency of the network in meeting the Conservation Objectives.

Participants agreed to discuss specifics regarding functions and properties of indicators in the context of MPA networks and to work through the set of steps or process to select indicators. The need to discuss further monitoring protocols and strategies and how the international and domestic experiences could inform the identification of monitoring protocols and strategies in the context of MPA networks was noted.

## REVIEW OF KEY POINTS FOR OBJECTIVE 2

**Co-Chair Cecilia Lougheed reviewed the key points for objective 2 of the terms of reference.**

### Indicators

It was agreed that Alida Bundy's presentation provided a thorough overview and there was consensus to use the process set out in her presentation for the respective section in the SAR. It was recommended that there be an overarching statement about indicators that are responding to a conservation objective at an operational level. It was argued that a desirable list of indicators should be developed initially prior to checking against the criteria provided.

There are a variety of different indicators at the functional, strategic and operational levels. Indicators are needed for both the design properties and the operational objectives. Conservation Objectives could still be recommended even if there is no indicator yet available, as one might be developed in the future.

There was discussion concerning the added value of the network over a collection of MPAs. An indicator that is effective to assess change at a network level would be different than an individual MPA. For example, an indicator of a network could be rates of recolonization of local or regionally extirpated species in areas where they formally occurred. Regardless, any indicator must be directly linked to the objective.

It was questioned if all MPAs within a network should be monitoring the same indicators. It was pointed out that California has done a lot of work in this area. The idea is to scale up without inventing new indicators to get network information. It was agreed that the general idea has merit and will help assess if the design of the network (e.g., connectivity, representation) is adequate. It is necessary, however, to state the expectation of the network. If the expectation is protection, then one would not expect to see change, whereas if the expectation is that things will improve as part of the network, then change would be anticipated. There was consensus to include a point in the Science Advisory Report that the same indicators should be included throughout the network to help evaluate the effectiveness of the network. There was discussion regarding whether the same benchmark should be included throughout the network but no consensus was reached on this point.

### Selection Criteria for Indicators

There was a discussion regarding the properties of indicators and it was agreed to start with the list developed by Rice and Rochet (2005) and include any appropriate information based on regional experience (e.g., Gully MPA). For the indicator development process, it was agreed to include the steps presented by Alida Bundy for identifying indicators with some additional descriptive text to be added.

### Monitoring Protocols and Strategies

It was agreed to add something on citizen science and community involvement based on Joclyn Paulic's presentation from the section on protocols and strategies for each indicator. Wording

for protocols and strategies would be added for each indicator based on previous or ongoing research efforts, where possible.

It was noted that there is a need to not only monitor within MPA but also outside in order to signal change, as per the wording from guiding principles for monitoring protocols in the TNMPA, where applicable.

### Timeframes for indicators

It was agreed that a statement was needed that timeframes for indicators are important to consider.

### Evaluation

Indicators should be based on whether they are responsive / sensitive to change, allowing detection of whether there is a decline, no change or improvement when monitoring. It was noted that the monitoring protocol needs to be adequate to assess and interpret changes so that the conclusions are defendable (assuming that power analysis would be done to ensure that the monitoring program is robust). Ideally, monitoring should begin right away as soon as areas are established.

There was a discussion of the monitoring program showing that the network has added value. It was noted that Glen Jamieson had looked at some of the very best examples of MPA networks in the world and the question of value added has not been asked with the exception of California.

## REVIEW OF Science Advisory Report

An early draft of the SAR was presented and further drafting and revising continued during the afternoon of the 2nd and morning of the 3rd day of the meeting.

In response to a comment that *Oceans Act* MPAs are difficult to move once established, it was noted that changes can be made by an Order in Council.

It was agreed that representativity is not a conservation objective but a tool to protect biodiversity, noting that it had already been decided that representativity is a design feature. It was clarified that when thinking about conservation objectives, habitats need to also be considered.

There was consensus to add the figure presented by Marty King to the SAR with some modifications, but the group was not able to agree on the revised figure and in the end the figure was not included in the SAR.

There was concern noted that the examples provided in the SAR are species biased (i.e., fish only) and it was agreed that further examples would be provided to avoid this bias or clarifications would be included.

There was a discussion regarding biodiversity and hyper abundance (over-dominance of one species). To determine appropriate target levels, it was suggested that historical levels could be considered. The interruption of natural processes that lead to overabundance was another consideration.

Under additional considerations in setting objectives, it was agreed to highlight that issues such as climate change were not addressed at the meeting but are important and that ongoing research may contribute to provide guidance on this topic. It was agreed that a separate process would be needed to address this issue.

There was a discussion regarding the relationship of LOMAs and integrated management to MPA networks. Following the report from the subgroup, there was some confusion as to what the subgroup was tasked. At the strategic level, bioregions need to develop their own strategic objectives. Although there was agreement that the LOMA objectives are at the appropriate level, it was noted that the LOMA objectives could not be adopted directly as the pool of objectives for that network.

## CLOSING REMARKS

An editorial board was established to finish drafting the SAR, which was circulated to all participants following the meeting for comment. The next steps were explained by co-chair Lougheed and the participants were reminded of the CSAS timeline. The meeting was then adjourned.

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## APPENDIX 1 – LIST OF PARTICIPANTS

| Participant | Region | Oct-03 | Oct-04 | Oct-05 |
|---|---|---|---|---|
| Eddy Kennedy | DFO-Maritimes | X | X | X |
| Jake Rice | DFO-NHQ | X | | |
| Cecilia Lougheed | DFO-NHQ | X | X | X |
| Sherry Walker | DFO-NHQ | X | X | X |
| Mary Rothfels | DFO-NHQ | X | X | X |
| Victoria Sheppard | DFO-NHQ | X | X | X |
| Jessica Mitchel | DFO-NHQ | X | X | X |
| Jim Boutillier | DFO-Pacific | X | X | X |
| Miriam O | DFO-Pacific | X | X | X |
| Joclyn Paulic | DFO-Central & Arctic | X | X | X |
| Michel Gilbert | DFO-Quebec | | X | X |
| Atef Mansour | DFO-Newfoundland & Labrador | X | X | X |
| Corey Morris | DFO-Newfoundland & Labrador | X | X | X |
| Nadine Templeman | DFO-Newfoundland & Labrador | X | X | |
| Michelle Greenlaw | DFO-Maritimes | X | X | X |
| Nancy Shackell | DFO-Maritimes | X | X | |
| Alida Bundy | DFO-Maritimes | X | X | X |
| Karen Leslie | DFO-Pacific | X | X | X |
| Leah Brown | DFO-Central & Arctic | X | X | X |
| Guy Cantin | DFO-Quebec | X | X | X |
| Laura Park | DFO-Newfoundland & Labrador | X | X | |
| Christine Ferron | DFO-Gulf | X | X | X |
| Marty King | DFO-Maritimes | X | X | |
| Maxine Westhead | DFO-Maritimes | X | X | |
| Francine Mercier | Parks Canada | X | X | X |
| Suzan Dionne | Parks Canada | X | X | X |
| Karel Allard | Environment Canada | X | X | X |
| Doug Biffard | Province | X | X | X |
| David MacKinnon | Province | X | X | X |
| John Roff | Academia | X | X | X |
| Isabelle Cote | Academia | X | X | X |
| Glen Jamieson | DFO Emeritus Scientist | X | X | X |

## APPENDIX 2 – TERMS OF REFERENCE

**Guidance on the Formulation of Conservation Objectives for Bioregional Marine Protected Area Networks, as well as Guidance on the Identification of Indicators, Monitoring Protocols and Strategies to Evaluate their Effectiveness**

**National Peer Review - National Capital Region**

**3-5 October, 2012**
**Montreal, Quebec**

**Co-Chairs: Jake Rice & Cecilia Lougheed**

### Context

Canada's *Oceans Act* (1997) authorizes Fisheries and Oceans Canada (DFO) to conserve and protect living resources and their supporting ecosystems through, among other measures, the creation of Marine Protected Areas (MPA) and MPA networks. In 2011, Canada's federal, provincial and territorial members of the Canadian Council of Fisheries and Aquaculture Ministers reviewed and approved in principle a *National Framework for Canada's Network of Marine Protected Areas* (Government of Canada, 2011). Canada has also committed to the establishment of a network of MPAs at a number of international fora, including the World Summit on Sustainable Development (Johannesburg, 2002), and the Convention on Biological Diversity (CBD) Conference of the Parties (COP) Decision VIII/24 (UNEP, 2006). The CBD subsequently provided technical guidance on establishing MPA networks in the CBD-COP9 Decision IX/20 [Marine and Coastal Biodiversity] (UNEP, 2008).

Science has provided guidance to ensure national consistency in the implementation of these commitments, while allowing flexibility for adaptation to regional conditions. In 2009, science provided advice on MPA networks including CBD design features in the Annexes from Decision IX/20 (scientific criteria in Annex I and scientific guidance in Annexes II and III), particularly at regional scales (DFO, 2010). It was clear that as the policy discussion and implementation of MPA networks evolves, Science advice would be required to address other implementation questions.

Among the implementation priorities are defining MPA network conservation objectives and evaluating the network's effectiveness in achieving those objectives. Conservation objectives are important components of a bioregional MPA network and as such network-level indicators and monitoring protocols and strategies are required (as opposed to MPA-specific ones) to evaluate progress in achieving these objectives. The identification of indicators, monitoring protocols and strategies to test MPA network effectiveness is also a commitment under the Health of the Oceans initiative. Science advice is required to continue to ensure sound methodology and national consistency.

The purpose of this national science peer review process is to provide guidance for the development of measurable conservation objectives for MPA networks, as well as guidance on the identification of indicators, monitoring protocols and strategies to evaluate the effectiveness of the networks. To the extent possible, the advice will consider the goals, design properties, etc., outlined within the *National Framework for Canada's Network of Marine Protected Areas*, particularly goal #1: To provide long-term protection of marine biodiversity, ecosystem function and special natural features.

### Objectives

The two primary objectives for this meeting are to provide:

1. Guidance on the formulation of conservation objectives for bioregional MPA Networks in Canada.

   Develop guidance on the formulation of measurable conservation objectives for Canada's bioregional networks of MPAs (types and phrasing of objectives, consistent with national MPA network goals). Include the level of specificity that conservation objectives should have in order to identify indicators for monitoring. Provide guidance on whether network-level conservation objectives should differ from, relate to or complement site-specific MPA conservation objectives and how. In developing the guidance consider:

   a. International best practices related to the formulation of conservation objectives for MPA networks;

   b. Existing guidelines for phrasing conservation objectives that were developed for the LOMAs; and,

   c. Existing domestic science advice specific to regional MPA networks.

2. Guidance on the selection of indicators and development of monitoring protocols and strategies to evaluate the effectiveness of Canada's bioregional MPA networks in meeting their conservation objectives.

   Develop guidance for identifying indicators and developing monitoring protocols and strategies that would effectively measure changes of the indicator over time, to evaluate if the conservation objectives of the MPA network are being achieved. Provide guidance on setting benchmarks for indicator evaluation for general conservation objectives such as those included in goal #1 of the National Framework (marine biodiversity, ecosystem function and special natural features). To the extent possible, include recommendations on the types of analyses that could be used to measure the effectiveness of the network in meeting its conservation objectives. In developing the guidance consider:

   a. International best practices related to indicators and monitoring protocols to evaluate effectiveness of an MPA network in achieving its objectives;

   b. Existing science advice (domestic and international) on selection of appropriate and meaningful monitoring indicators.

Participants will develop national guidance by first evaluating national and international experiences with developing conservation objectives and identifying indicators, monitoring protocols and strategies for MPA networks, and then by discussing the extent to which existing methodologies could be applied in the Canadian context. To the extent possible, the advice will consider the goals, design properties, etc., outlined within the *National Framework for Canada's Network of Marine Protected Areas*.

**Expected Publications**

- Science Advisory Report (1)
- Proceedings (1)
- Research Document (1)

**Participation**

- DFO Ecosystems and Oceans Science
- DFO Program Policy
- DFO –Oceans (Regions)
- Parks Canada
- Environment Canada

- Provincial/Territorial experts
- Academia

**References**

DFO. 2007. Guidance Document on Identifying Conservation Priorities and Phrasing Conservation Objectives for Large Ocean Management Areas. DFO. Can. Sci. Advis. Sec. Sci. Advis. Rep. 2007/010. [PDF]

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## APPENDIX 3 - EXPERT REVIEW BY DR. ISABELLE COTÉ

Comments on: Jamieson, G.S. 2012. Review and analysis of key international approaches to establish conservation objectives, identify indicators and develop monitoring protocols that evaluate the effectiveness of Marine Protected Area (MPA) networks. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/nnn. vi + xx p.

**Key points from presentation made to the group.**

- The working paper covered a range of case studies of MPA 'networks', which vary greatly in characteristics (Table 1). It is not clear to what extent these sets of MPAs actually function as networks at present.

*Table 1. Characteristics of networks in review*

| | Area | % EEZ | #MPAs | MPA Types |
|---|---|---|---|---|
| Australia | 880,000 $km^2$ | 10% | 200+ | 6 (IUCN cat.) |
| California (South) | 917 $km^2$ | 15% | 52 | 5 |
| UK | 41,000 $km^2$ | 4% | 189 | 5 |
| OSPAR | 439,679 $km^2$ | 3% | 181 | ? |
| South Africa | 4523 $km^2$ | 0.4% | 22 | 4 |
| Kiribati | 408,250 $km^2$ | 11% | 1 | 4 zones |

- The overarching goals of the networks reviewed were also highly variable. A cursory analysis of keywords derived from these network goals (Table 2) suggests that one of the five CBD network properties, i.e. representativity, is fairly consistently important in the articulation of network goals. Representativity is most often expressed in terms of habitats.

*Table 2. Keywords found in network goals*

| | |
|---|---|
| Australia | Comprenhensive, adequate, representative, long-term, viability, processes, systems, diversity |
| California | Diversity, structure, function, integrity, representative, unique, ecosystems, populations, habitats |
| UK | Lon-term, survival, species, habitats |
| OSPAR | Protection, restoration, precautionary principle, representation, species, habitats, processes |
| South Africa | --- |
| Kirbati | Conserve, manage, natural, cultural, sustainable benefit |

- The wording of network objectives is clearest when legislation is very explicit. Two examples were contrasted.

The Great Barrier Marine Park Act requires the assessment of:

- *current biodiversity within the GBR region*
- *current health of the ecosystem within the GBR region and of the ecosystem outside that region to the extent that it affects that region*
- *commercial and non-commercial use*
- *existing measures to protect and manage the ecosystem within the GBR region*
- *current resilience of the ecosystem*

These legislated requirements have led directly to specific network objectives for the GBR MPA.

In contrast, the monitoring requirements outlined in the South Africa Protected Areas Act are much more limited and vaguer:

1) *The Minister may establish indicators for monitoring performance with regard to the management of NPAs and the conservation of biodiversity in those areas.*

2) *The MEC [the regional authority] may establish indicators for monitoring performance with regard to the management of provincial and local PAs and the conservation of biodiversity in those areas.*

3) *The management authority of a PA must-*

    a. *monitor the area against the indicators set in terms of subsection (1) or (2); and*

    b. *annually report its findings to the Minister or MEC, as the case may be, or a person designated by the Minister or MEC.*

As a result, the objectives of the MPA network of South Africa are not only vague, they simply do not exist!

The legislation pieces overseeing protected or conservation sites contributing to potential Canadian MPA networks appear to be closer to the South African model than to the Australia one in terms of specificity of monitoring and reporting requirements. An analysis of the number of mentions of words relating to network assessment and evaluation and aspects of biodiversity and ecosystem health in the Oceans Act and the NMCA Act is shown in Table 3.

*Table 3. Numbers of mentions of various words relating to potential aspects of network performance in the Canadian Oceans Act and NMCA Act. Variants of the search words (e.g., assess, assessment, assessed) were all considered.*

| | *Oceans Act* | *NMCA Act* |
|---|---|---|
| Monitor | 1 | 3 |
| Assess | 0 | 1 |
| Evaluate | 0 | 2 |
| Report | 4 | 3 |
| Health | 0 | 1 |
| Biodiversity | 1 | 1 |
| Resilience | 0 | 0 |

The lack of specificity in Canadian legislation may be a mixed blessing. On one hand, it means that managers are not constrained in articulating network objectives that are meaningful and comprehensive. On the other hand, network objectives that are clearly linked to legislated requirements may be more easily justified.

- In terms of indicators, monitoring protocols and stakeholder involvement, much can be learned from the California experience. A public-private partnership led to the establishment in 2007 of the MPA Monitoring Enterprise, which was charged with leading the development and implementation of impartial, scientifically rigorous and cost-effective MPA monitoring. The monitoring protocols developed combine all elements of best practice, customised to the California context, and include significant efforts in collecting pre-establishment baseline data.

- Finally, I suggested that even the most robust monitoring schemes did not appear to be specifically designed to evaluate *network* effectiveness. However, strategic analysis of MPA-level indicators could yield proxies of network-level performance.

**Review of working paper**

In general, I found the review to be thorough, and the author did a remarkable job given the number and specificity of questions set out in the ToR. The case studies selected are those which would be expected to be included in such a review. The only missing case study I can

think of is New Zealand which, with an MPA system under a single political jurisdiction, would have been potentially relevant addition, but I understand that time constraints prevented its inclusion. The synthesis and conclusions are well articulated and accurately reflect the material presented. The summary tables (Tables 9 and 10) are very useful as a distillation of a large amount of information.

Here are a few points that, if addressed, could make the review even more effective.

1. Goals vs objectives. Although these are clearly defined at the onset, they are not used as defined throughout the document. The author might have used the terminology adopted in each of the case studies, but this is often not consistent with the initial definitions and ends up being confusing.
2. General organisation and extraneous material. Although the general format of the presentation of each case study was structured around the questions asked in the ToR, there were deviations in some places (e.g., presentation of Australia's NRSMPA) and some material that was not immediately relevant in other places (I can provide an annotated pdf). Removal or reorganisation of this material would streamline the report.
3. Networks and 'subnetworks'. The examples of the GBR, Victoria State, and the Channel Islands are useful because these are some of the longest-running MPA 'networks' existing, but all have now been subsumed into larger networks. This was made clear for California, but not so clear for Australia. Similarly, the relationship between the Natura 2000 sites in the UK and the UK sites that are meant to contribute to the OSPAR network is not clear.
4. Table 3 needs to be revised as it is not very useful in its current form. Goals and objectives seem to be mixed up, and what is called goals does not appear to be goals (or objectives).
5. 'Functional' networks. The author highlights Australia and California as the best examples of functional networks. While I agree that both locations are the best examples of 'how to build a network', I would argue that it is premature to label either network as functional. Although these networks have been designed following the best available scientific guidelines, neither has been evaluated as a network, and the older components of these networks (GBR and Channel Islands), which have been evaluated, are each a single MPA with multiple, small no-take areas.
6. Connectivity. I believe that the importance of connectivity as a network feature and the lack of effort in evaluating it in existing networks are underplayed in the review. This critical feature is overlooked in most site selection and monitoring schemes – Table 10 shows this quite clearly – and yet, it is possibly the most important feature for long-term sustainability of species within networks.

## APPENDIX 4 – EXPERT REVIEW BY DR. JOHN ROFF

A brief Review and Summary of the DFO working paper

**"Review and analysis of key international approaches to establish conservation objectives, identify indicators and develop monitoring protocols that evaluate the effectiveness of Marine Protected Area (MPA) networks". By Glen S. Jamieson**

**NOTE**: This review and summary was conducted on the assumption that it constituted commentary for the DFO meeting on MPA Networks. I have no problem considering that this paper should be accepted as a Res Doc for DFO as it stands. However a further revision of the paper is warranted for grammar, spell check and consistency of the use of terms such as 'Network'.

**WHAT THIS PAPER DOES**

1) The objective of this paper is to provide scientific advice on the extent to which existing international MPA monitoring protocols and indicators could be applied to Canada, in the context of the *National Framework for Canada's Network of Marine Protected Areas*. This is a most valuable exercise, because in Canada, Marine Protected Areas (MPAs, NMCAs etc) have been designated in a piecemeal fashion, one site at a time.
2) This paper provides in-depth reviews of the types of objectives, indicators and monitoring protocols used by various international governments or agencies, that have already established MPA networks. But: it is not clear how or why these particular studies were chosen for review, and a copy of the TORs for the review would have been useful.
3) One major consideration was to evaluate the 'added value' of a network approach –over a simple collection of site-specific MPAs.
4) For each international example reviewed, a particular framework was requested for the analysis, to include the following criteria:
    a) MPA Network Objectives
    b) Design Criteria
    c) Indicators and Monitoring Protocols
    d) Management Measures
5) The bulk of the paper then consists of a case-by-case evaluation of the criteria in # 4 above.
6) It is clear that even where nations (or sub-national jurisdictions) have historical experience with MPA planning, implementation of ALL of the above criteria leaves much to be desired. The process of establishing Networks of MPAs should therefore be considered as a process of evolution and adaptive management.
7) A review of the Goals and Objectives (NOTE that these terms are differently defined in para 4 of P6 of the report) for individual MPAs or for their combined Networks, shows that while overall Goals are generally defined, specific objectives are often lacking.
8) It is also troublesome that the sizes and distances apart of individual MPAs are generally not defined, or are arbitrarily defined (se e.g. para 1 P 38).
9) The paper importantly draws out the significance of involving local people in MPA planning. It states: "A major weakness identified in a number of the management plans was the limited meaningful involvement of affected local communities in the planning process".
10) Of the 'Networks' of MPAs examined, the report concluded that the most functionally effective and documented were in Australia and California. It is suggested that in part this

was because only "single jurisdictions" and "single ecosystems" were involved (giving managers full authority), and because these 'Networks' have been established for at least a decade, there has been time for adaptive management and network evaluation.

11) The report concludes that "the approaches in MPA network development that are likely to be ultimately adopted in Canada's oceans have invariably been considered and evaluated at least in part elsewhere at some time". This is only partially true; some necessary elements of network development and management are lacking altogether or have not yet been adequately examined in other national plans for MPA Networks. These are presented below.

12) Perhaps the most important subject addressed by the paper (but NOT resolved) is HOW Networks of MPAs can add value to a SET of MPAs.

**WHAT THIS PAPER DOES NOT DO**

1) It is really important to distinguish between a 'Set' of MPAs – which may represent all elements of marine biodiversity in an ecoregion, protect natural ecosystem functions, allow for fisheries management, and achieve other objectives, AND: A true Network of MPAs which demonstrate patterns of connectivity among the component MPAs (this is the significance of size and distance apart of MPAs). The paper (and indeed the authors of the studies reviewed in the paper) does not always distinguish between these two concepts (but see para 3 P 29), although it states that an MPA Network may evolve over time as information accrues. It would be more appropriate to say that a Set of MPAs may evolve INTO an MPA Network over time. In short, it is not clear that the 'value-added factors has been effectively evaluated OR that criteria have been established for its evaluation.

2) The following subjects are particularly weakly or inadequately addressed in other national MPA Network plans:

   a) Criteria of depth zonation for representation. As a bare minimum coastal waters (especially bays and estuaries) should be separately planned and monitored to distinguish them from the bulk of other shelf/ EEZ waters.

   b) The appropriate size of individual MPAs is a function at least in part of the objectives for them. Without clear goals and objectives we cannot expect to define size.

   c) Oceanographic flow models (of which we have excellent examples in Canada) can lead to decisions on spacing of MPAs. This subject has not been sufficiently reviewed in the paper.

   d) There is a complete lack of information on genetic techniques (as opposed to genetics as a component of biodiversity) which can provide cost-effective and vital information for a multitude of planning and monitoring purposes.

   e) The combination of oceanographic data/ models and genetic data provides the most powerful tool for MPA Network planning and adaptive management.

   f) The issue of 'zoning of uses' and 'multiple use MPAs' is critical. HOW decisions are made on these issues with respect to both individual MPAs and to the Network are fundamental to subsequent success. Too little access will be resisted; too much access and too many permitted uses will guarantee that objectives and expectations will not be met, and that 'success' cannot be demonstrated.

   g) The current problem of climate change and how to adapt to it for medium and long-term planning has barely been considered with respect to MPAs anywhere in the world.

3) Because this paper is a review of existing experiences in establishing 'Networks' of MPAs, it does not codify the most desirable or effective methods for:

a) Defining Network goals and objectives

b) Defining the design criteria for Networks

c) Defining the Indicators to be used, and Monitoring protocols that should be implemented

d) Defining Timelines for implementation and monitoring, and Baseline conditions before MPA establishment

e) Defining the 'Outcomes Criteria' by which 'success' of a Network might be evaluated, and specifically HOW the 'value-added' of a Network can be assessed.

f) Defining management methods.

4) In addition to the above, the following subjects require particular attention in Canada if effective series of MPA Networks are to be established:

a) How the general public and interest groups (such as the fisheries lobby) are to be involved in the planning process

b) How the mandates of DFO, Parks Canada, the Provincial Governments and NGOs are to be integrated

c) How our almost non-existent monitoring programs (see e.g. DFO ESTR reports) will be enhanced to evaluate Networks of MPAs.

Finally: although Canada is rather late in establishing its Networks of MPAs, nevertheless we now have the experiences of several other nations to draw on, in order to plan with Best Practices in mind, and to engage in genuine Adaptive Management of our oceans. However, there is a significant level of scepticism about the value of MPAs in certain interest groups, even where their value **has been** demonstrated. If we fail to demonstrate value, by ineffective monitoring, we shall create a negative self-fulfilling prophecy.